



Special Issue on Engineering Applications of Memetic Computing

I. AIM AND SCOPE

Computational drawbacks of existing derivative-based numerical methods have forced researchers all over the world to rely on metaheuristic algorithms founded on simulations of nature for solving computationally intractable engineering optimization problems since the past two decades. Within this growing trend, the methodology, collectively known as *Memetic Computing*, marks one of the most recent success stories of mimicking the nature and culture. Memetic Computing first emerged as a family of population-based metaheuristic algorithms that are inspired by Darwinian principles of natural selection and Dawkins' notion of a meme defined as a unit of cultural evolution that is capable of local/individual refinements. The metaphorical parallels to, on the one hand, Darwinian evolution and, on the other hand, between memes and domain specific heuristics are captured within memetic algorithms thus rendering a methodology that balances well generality and problem-specificity. Hence Memetic Computing captures the power of both biological selection and cultural selection. The idea of going beyond biological evolution towards a dual track comprising biological-cultural selection has indeed transcended the field of combinatorial and continuous optimization. Most importantly, recent literature is continually indicating that the concept of "meme" dispersal and selection can be exploited in, for example, robotics engineering, multi-agent systems, robotics, optimization, software engineering, computational biology, business intelligence, and the social sciences.

Although the application-oriented research with Memetic Computing has reached an impressive state by now, nevertheless, there exist a number of critical issues regarding the design of memetic algorithms for specific problems and with the rapidly growing complexity of the real world, challenging application areas are emerging.

This special issue aims at bringing together researchers from academia and industry to report and review the latest progresses in the application-oriented research with Memetic Computing, to explore new application areas, to design new memetic algorithms for solving specific hard optimization problems, and finally for creating awareness on Memetic Computing to a wider audience of practitioners.

II. TOPICS COVERED

Authors are invited to submit their original and unpublished work on the applications of Memetic Computing frameworks in relevance to areas including (but not limited to) the following:

- 1) Novel concepts of memetic computation and its adaptation into evolutionary framework and algorithms for handling real world optimization problems.
- 2) Memes, memplexes, meta-memes in computing and high-order evolution.
- 3) Memetic frameworks for handling constrained, multi-objective, dynamic, and large scale optimization problems.
- 4) Memetic algorithms in real world applications such as scheduling, allocation, design etc.

- 5) Meme-gene coevolutionary frameworks and multi-inheritance model for various practical applications.
- 6) Partial or full or meta-Lamarckian/Baldwinian, meta-learning, agent based memetic computation.
- 7) Parallel memetic framework for practical applications.
- 8) Memetic computing for practical problems from broad areas like systems engineering, human factors and human machine systems, and cybernetics.

The authors are expected to compare their memetic computing methods with the most recent and state-of-the-art techniques for solving the problem they address and thus they should illustrate the effectiveness of their techniques in solving the problem in terms of final accuracy, speed, robustness etc.

III. IMPORTANT DATES

- December 31, 2010, Submission deadline
- April 15, 2011, Notification of the first-round review
- July 1, 2011, Revised submission due
- October 15, 2011, Final notice of acceptance/reject
- November 15, 2011, Final manuscript

The expected publication time of the special issue will be in the middle of 2012.

IV. SUBMISSION

All manuscripts should be submitted electronically to the IEEE SMCC Electronic Submission System/Manuscript Central at <http://mc.manuscriptcentral.com/smcc-ieee>. The authors should state in the "Cover Letter to Editor-in-Chief" section the following sentence: "This manuscript is submitted for the Special Issue on Engineering Applications of Memetic Computing (editors: Lim, Das, Ong)". For detailed submission information, please refer to "Information for Authors" at <http://www.ieee-smc.org/publications/>

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